
QPC513 Enhanced Serial Data Interface Card

The QPC513 Enhanced Serial Data Interface (ESDI) Card gives the Meridian 1 switch two fully synchronous high-speed serial ports.

These high-speed synchronous ports are used to connect the Meridian processor to synchronous communication peripherals such as Meridian Mail or to a host computer (DEC, Tandem, etc.) using Meridian Link. This card cannot be used as an asynchronous port or to connect to an administrative and maintenance terminal. Use either the NT8D41 SDI Paddle Board or the QPC841 Quad Serial Data Interface Card to connect the Meridian 1 switch to an asynchronous serial peripheral.

Each Meridian 1 system can accommodate up to eight ESDI cards, for a total of 16 synchronous ports per system. The ESDI cards can be housed in the network slots of any of the following modules:

- NT5D21 Core/Network Module (slots 0 through 7) for system options 51C, 61C, and 81C
- NT6D39 CPU/Network Module (slots 1 through 9 and 13) for system options 51 and 61
- NT6D60 Core Module (slots 0 through 5) for system option 81
- NT8D11 Common/Peripheral Equipment (CE/PE) Module (slots 4 through 9 in the “NET” area) for system options 21, 21A and 21E
- NT8D34 CPU Module (slots 6 through 13) for system option 71
- NT8D35 Network Module (slots 5 through 13) in active network groups for system options 71 and 81
- NT9D11 Core/Network Module (slots 0 through 8) for system option 61C

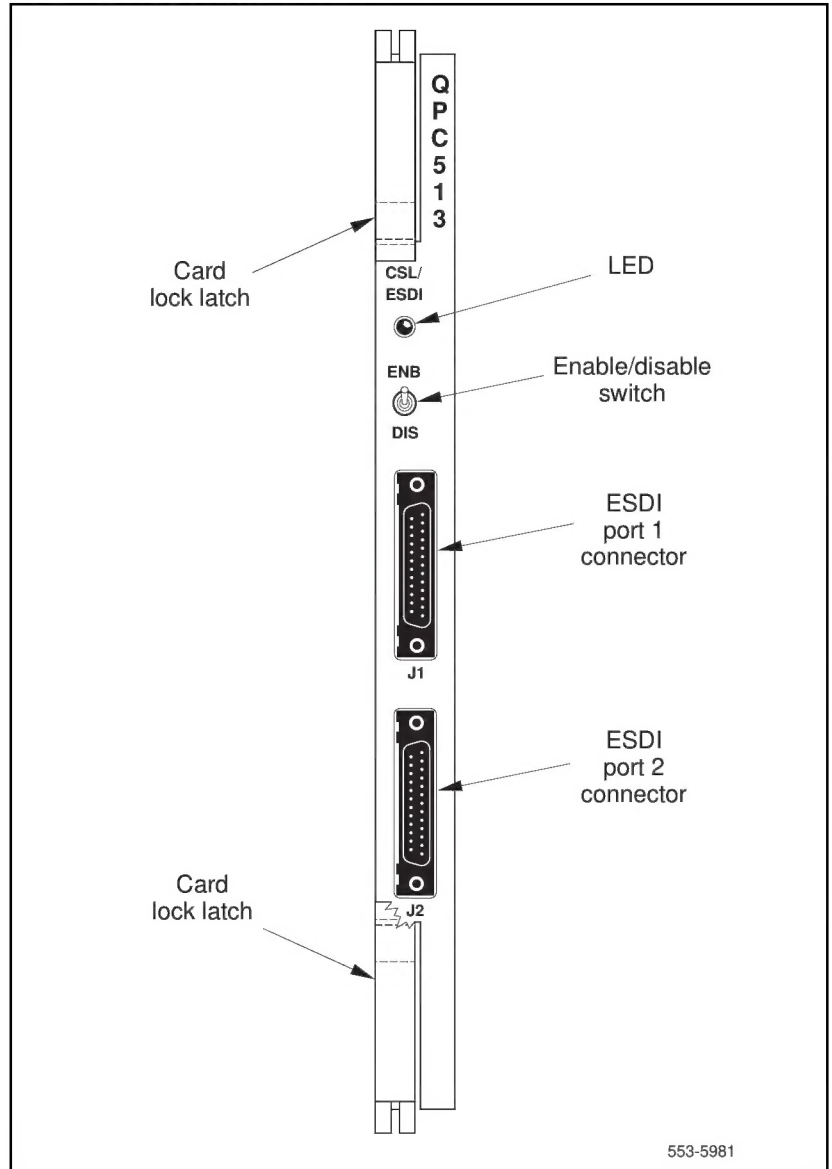
Note: When an ESDI card is installed in an NT6D60 Core Module, an NT8D34 CPU Module, or slot 13 of an NT6D39 CPU/Network Module in a dual-CPU system, any input/output (I/O) device connected to the card does not function when the CPU in that module is inactive.

Physical description

The ESDI card circuitry is contained on a 31.75 by 25.40 cm (12.5 by 10 in.) printed circuit board. The front panel of the card is 2.54 cm (1 in.) wide. The front panel (see [Figure 12](#)) is equipped with an enable/disable (ENB/DIS) switch and a red light-emitting diode (LED). The LED is lit when

- the ENB/DIS switch is set to DIS
- both ports are disabled in software
- none of the card's ports have been configured in software
- the switch settings on the card do not match the settings programmed in software

Figure 12
CPC513 ESDI Card front panel



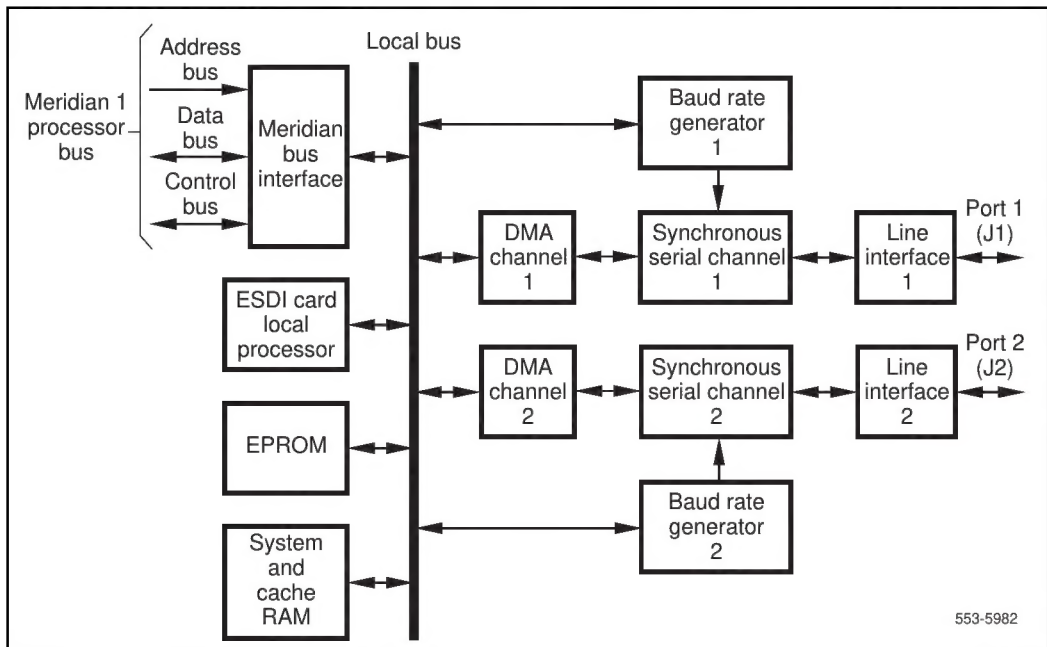
Functional description

The QPC513 ESDI Card ([Figure 13](#)) is an intelligent, two-port synchronous serial data interface card. The two serial input/output data ports terminate on DB-25 connectors on the front panel of the card.

Each port operates independently in synchronous mode, in half or full duplex, at speeds of up to 64 kbps. Each port can be connected to either data terminal equipment (DTE) or data communications equipment (DCE).

The electrical interface for the ESDI card may be either EIA RS-232-C or a proprietary high-speed interface. The high-speed interface combines features of RS-422-A for data and timing signals with features of RS-232-C for control signals.

Figure 13
ESDI card block diagram



The QPC513 ESDI Card is an intelligent controller. The local micro-processor performs all of the overhead associated with synchronous data transfer. The Meridian 1 processor passes data to the ESDI card processor a byte at a time using conventional memory reads and writes. The ESDI card processor stores the data in a RAM cache on the ESDI card, and passes it to the synchronous communications chip in blocks using direct memory access (DMA) techniques.

Synchronous communications

The ESDI cards supports LAPB, a subset of the HDLC synchronous protocol. A description of the LAPB protocol is shown in Appendix A, LAPB data link protocol.

The HDLC data link is a bit-oriented protocol. The information data bits are transmitted transparently across the link in packets. The maximum length of the information field for these packets is 128 octets, where an octet consists of 8 bits.

The characteristics of the synchronous communications ports are shown in [Table 20](#).

Table 20
Characteristics of synchronous ports

Characteristics	Description
Duplex mode	half, (full)
Data rate (bps)	1200, 2400, (4800), 9600, 19200, 48000, 56000, 64000
Clock	(internal), external
Data Link Level LAPB protocol SL-1 address	(1), 3
Data Link Level LAPB protocol remote host address	(3), 1
Modify link control system parameters*	yes, (no)
Modify link performance thresholds (Note 1)	yes, (no)
* See the Configuration Record (LD 17) in <i>X11 input/output guide</i> to modify the link control system parameters and performance thresholds.	
Note: The values in parentheses are the default.	

Clock timing option

The ESDI card offers two timing options:

- Internal: The ESDI card uses an internal timing source to synchronize data transfers to the external device.
- External: The ESDI card accepts a timing source from the high-speed interface connector to synchronize data transfers to the external device.

Test and maintenance features

The ESDI card has these built-in testing and maintenance capabilities:

Self-test

The ESDI card performs a self-test of its major components immediately after power-up. The self-test can also be initiated through the Link Diagnostic program (LD 48). The self-test tests all ESDI functions up to, but not including, the ESDI line drivers and receivers.

Fault detection

Firmware on the ESDI card detects hardware faults on the card and link level LAPB protocol faults. It reports them to the CPU when predetermined thresholds (downloaded at initialization) have been exceeded.

Fault isolation

The ESDI/command and status link (CSL) maintenance software takes the ESDI card out of service when the out-of-service thresholds are exceeded for

- LAPB error conditions (for example, retransmission, cyclic redundancy check (CRC) errors, overrun/underrun errors)
- Physical or link errors
- Detected hardware errors

Connection characteristics

The two DB-25 connectors on the front panel of the ESDI card provide connections to each of the two I/O ports. The electrical interface of these connectors is a modified version of the RS-422-A standard designed to drive high-speed data over long cable lengths (up to 100 ft). [Table 21](#) shows the interconnection specifications for these ports.

Table 21
QPC513 interconnection specifications

Distance	Interconnection
<15.24 m (<50 ft)	Regular 25-conductor cable
>15.24 m and <30.48 m (>50 ft and <100 ft)	Twisted pair for balanced circuits
>30.48 m (>100 ft)	Network interface devices such as stand-alone modems or DS-1 facilities using Asynchronous/Synchronous Interface Module (ASIM) and Data Line Card (DLC)

Electrical interface options

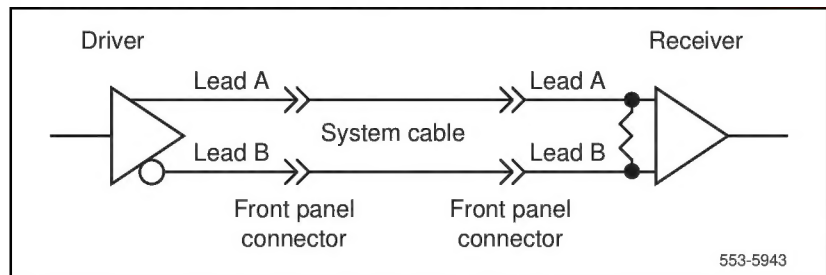
Interface options are selected by inserting jumper plugs into the appropriate sockets on the card:

- RS-232-C interface: The EIA RS-232-C interface can be used for speeds up to 19.2 kbps and distances of less than 15.24 m (50 ft). The ESDI card supports a subset of the RS-232-C signals (see [Table 22](#)).
- High-speed interface: The high-speed interface combines features of the RS-422-A standard for the data and timing signals with standard RS-232-C control signals. It is used when the signal rate is greater than 19.2 kbps and/or when the distance between the Meridian 1 and host is greater than 15.24 m (50 ft). No modems are needed if the distance is less than 30.48 m (100 ft).

The high-speed interface uses a proprietary pin assignment (see [Table 23](#)), rather than the standard 37-pin RS-449 arrangement. This pin arrangement is compatible with the Spectron Cable #75-025 for V.35 use.

The data and timing signals on the high-speed interface use RS-422-A type differential line drivers and receivers in a balanced configuration. These drivers and receivers are able to drive higher data rate signals over longer distances than standard RS-232-C drivers and receivers. A typical connection using these drivers and receivers is shown in [Figure 14](#).

Figure 14
Typical high-speed interface line driver and receiver



Connector pin assignments

[Table 22](#) shows the pin assignments for J1 and J2 when the port is configured for RS-232-C interface, and [Table 23](#) shows the pin assignments for J1 and J2 when the port is configured for the high-speed interface.

Table 22
Connector J1 and J2 pin assignments—RS-232-C interface

Pin number	Signal functions	Signal source		EIA circuit
		To DCE	From DCE	
Ground and common return				
1	Shielded	n/a	n/a	
7	Signal ground (SG)	n/a	n/a	AB
Data				
2	Transmitted data (TX)	✓	—	BA
3	Received data (RX)	—	✓	BB
Control				
4	Request to send (RTS)	✓	—	CA
5	Clear to send (CTS)	—	✓	CB
6	Data set ready (DSR)	—	✓	CC
8	Carrier detect (CD)	—	✓	CF
20	Data terminal ready (DTR)	✓	—	CD
Timing				
15	Transmitter signal element timing (DCE)	—	✓	DB
17	Receiver signal element timing (DCE)	—	✓	DD
24	Transmitter signal element timing (DTE)	✓	—	DA
Note: Pins not used are 9 to 14, 16, 18, 19, 21, 22, 25.				

Table 23
Connector J1 and J2 pin assignments—high-speed interface

Pin number	Signal functions	Signal source		EIA circuit (lead)
		To DCE	From DCE	
Ground and common return				
1	Shield	n/a	n/a	
7	Signal ground (SG)	n/a	n/a	AB
Data				
2	Transmitted data—lead A	✓	—	BA (A)
3	Received data—lead A	—	✓	BB (A)
13	Transmitted data—lead B	✓	—	BA (B)
16	Received data—lead B	—	✓	BB (B)
Control				
4	Request to send (RTS)	✓	—	CA
5	Clear to send (CTS)	—	✓	CB
6	Data set ready (DSR)	—	✓	CC
8	Carrier detect (CD)	—	✓	CF
20	Data terminal ready (DTR)	✓	—	CD
Timing				
12	Transmitter signal element timing (DTE)—lead B	—	✓	DD (B)
14	Transmitter signal element timing (DCE)—lead B	—	✓	DB (B)
15	Transmitter signal element timing (DCE)—lead A	—	✓	DB (A)
17	Transmitter signal element timing (DTE)—lead A	—	✓	DD (A)
23	Receiver signal element timing (DCE)—lead A	✓	—	DA (A)
24	Receiver signal element timing (DCE)—lead B	✓	—	DA (B)
Note: Pins not used are 9, 10, 11, 18, 19, 21, 22, 25.				

Configuring the ESDI card

Configuring the ESDI card consists of setting the port addresses using the address selection switch and setting the port interface options using the jumper blocks. The system software must then be configured to recognize the ESDI card. [Figure 15](#) shows the location of all option switches and jumper sockets on the ESDI card.

Address switch settings

The two ESDI ports on the card are addressed in pairs (0 and 1, 2 and 3, etc.). The address is set using switch S2. The switch settings used to select the address vary depending on whether the card is Style A or Style B. The “Style” can be read on the printed circuit board silk screen. The address of the card is set to match the device address defined in software.

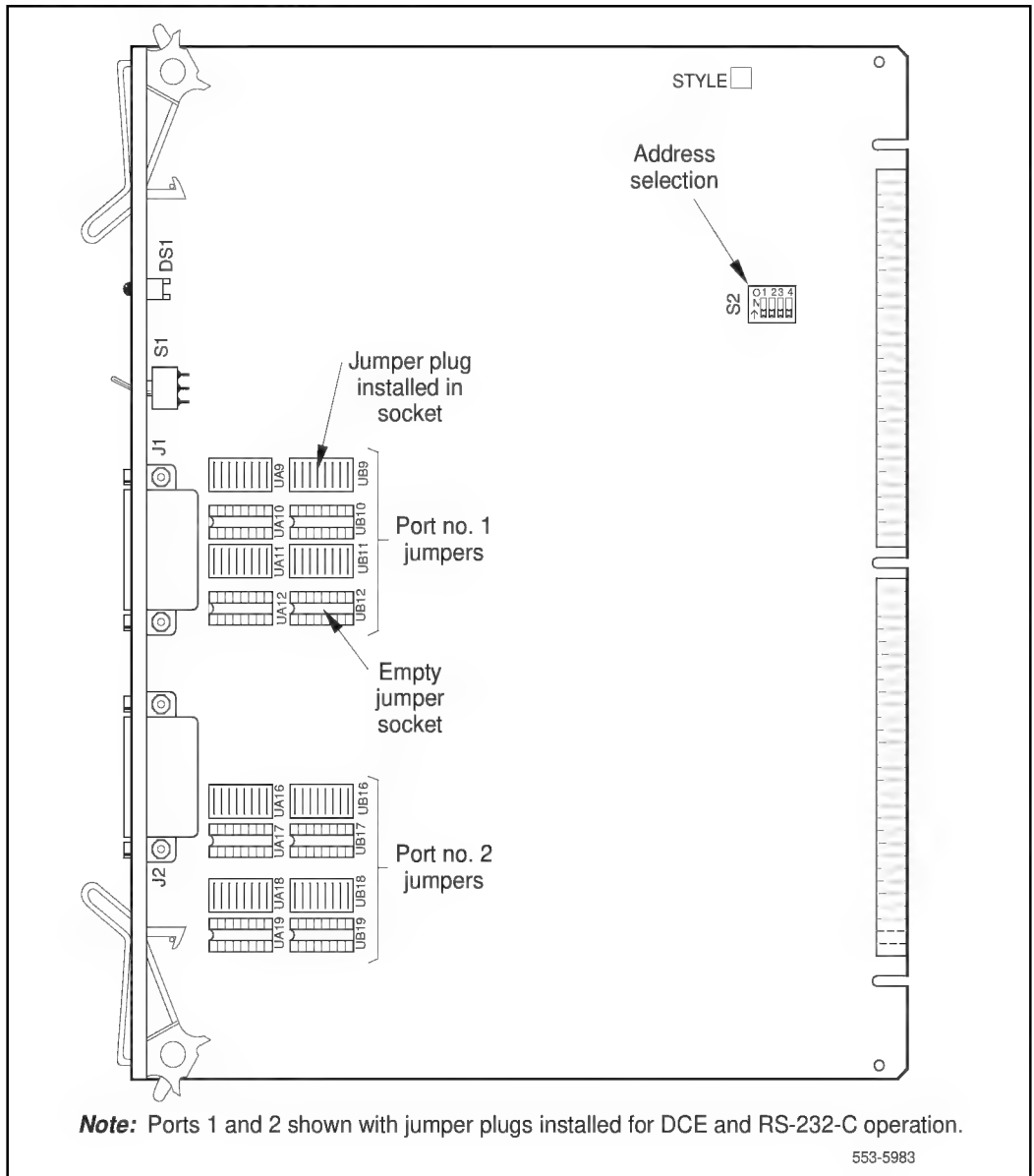
Synchronous port address space is the same as asynchronous port address space. When selecting an address for the ESDI card, make sure that it will not conflict with an address currently being used by an asynchronous card.

[Table 24](#) shows the ESDI card address switch settings.

Table 24
ESDI card address switch settings

Device Number		Switch S2 style A				Switch S2 style B			
Port 1	Port 2	1	2	3	4	1	2	3	4
0	1	off	off	off	on	off	off	off	*
2	3	on	off	off	on	off	off	on	*
4	5	off	on	off	on	off	on	off	*
6	7	on	on	off	on	off	on	on	*
8	9	off	off	on	on	on	off	off	*
10	11	on	off	on	on	on	off	on	*
12	13	off	on	on	on	on	on	off	*
14	15	on	on	on	on	on	on	on	*
* Switch S2, position 4 is not used on style B cards.									

Figure 15
ESDI card option switch locations



DTE/DCE mode jumper settings

The interface for each ESDI port is configured independently. Ports must be configured both for electrical interface (RS-232-C or high-speed) and mode (DTE or DCE). With the proper options set

- An ESDI port configured as DTE appears as a terminal to the user equipment.
- An ESDI port configured as DCE appears as a modem to the user equipment.

Interface options are set by installing option jumper plugs into the sockets indicated in [Table 25](#) and [Table 26](#).

Table 25
ESDI card DTE/DCE mode jumper settings

Mode	Port	Jumper socket designations	
Data communication equipment (DTE)	1	UA10	UA12
Data terminal equipment (DCE)	1	UA9	UA11
Data communication equipment (DTE)	2	UA17	UA19
Data terminal equipment (DCE)	2	UA16	UA18

Table 26
ESDI card RS-232-C/high-speed interface jumper settings

Mode	Port	Jumper socket designations	
RS-232-C interface	1	UB9	UB11
High-speed interface	1	UB10	UB12
RS-232-C interface	2	UB16	UB18
High-speed interface	2	UB17	UB19

Software service changes

All of the other ESDI port operating parameters (see [Table 20](#)) are defined in software and downloaded to the assigned ESDI port. These changes are made using the Configuration Record program (LD 17). Instructions for the Configuration Record program are found in the *X11 input/output guide*.

Some of the prompts that are commonly used when running the Configuration Record program (LD 17) are shown in [Table 27](#). These parameters must be set for each ports if both ports are being used.

Table 27
Serial port configuration parameters

Prompt	Response	Description
REQ	CHG	Change configuration.
TYPE	CFN	Configuration type.
IOTB	YES	Change input/output devices.
ADAN	NEW TTY x New PRT x	Define a new system terminal (printer) port as device x, where x = 0 to 15.
CDNO	1–16	Use the ESDI card number to keep track of all ports.
DENS	DDEN	Double density SDI paddle board.
USER	xxx	Enter the user of port x. The values that can be entered depend on the software being used. See the <i>X11 input/output guide</i> for details.
XSM	Yes, (No)	Port is used for the system monitor.

Applications

The QPC513 Enhanced Serial Data Interface Card is used any time that a high-speed, fully synchronous serial data communications channel is needed. The ESDI card is typically used to connect to

- Meridian Mail
- A host computer using Meridian Link
- An auxiliary processor

The Meridian 1 processor transfers data to the ESDI card in blocks consisting of 1 to 128 eight-bit octets. Each block is processed in accordance with the LAPB subset of the HDLC protocol and is transmitted serially to the output port.

In receive mode, the EDSI card receives data serially from the input port packages in LAPB information frames. After determining that the block is error-free, the ESDI card supplies the data to the Meridian 1 processor as a block.

The ESDI card serial ports terminate on the card front panel. [Figure 16](#) shows the typical ESDI card connections in a system.

Figure 16
QPC513 ESDI Card cabling